SEALED FOUR HEAT EXCHANGER VPX & CPCI-S 3U ENCLOSURE SERIES

- *A conventional card-cage format, front-to-back loaded 3U COTS chassis*
- *Progressive, 3, 5, 7 & 9 slot versions for conduction-cooled 1" pitch modules*
- *Forced-air heat exchanger sidewalls, top cover & rear panel*
- *Expressly suited for dry air contaminant-free high wattage SWaP applications*
- *Standard rugged or high airflow military PX2 rear fans*
- *Overhead internal forced-air recirculation for reduced payload hot spots*
- *Oversized output capacity military power supply options*
- *Up to 300 watts payload power dissipation in 9 slot version*

1" pitch

3 5 7 9

HES-FBL

HES - FRONT TO BACK LOADED

↑300W
PAYLOAD POWER DISSIPATION

HES - FRONT TO BACK LOADED 3U ATR

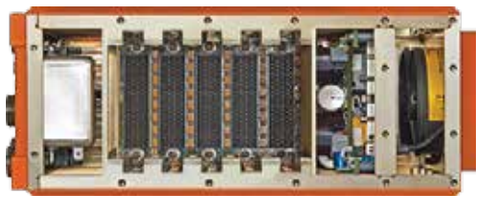
Heat Exchanger Sidewalls 3U ATR - Contaminant-free Enclosure

suitable for high wattage VPX & cPCI-S applications with 0.8, 0.85 & 1" pitch 3U eurocards

Our 3U series of *Four Heat Exchanger* sealed conventional card-cage enclosures have been designed for compact aerospace and UAV applications that require state-of-the-art power dissipation technology. This family of size-scalable chassis are ideal for advanced SWaP military systems operating in hostile air environments.

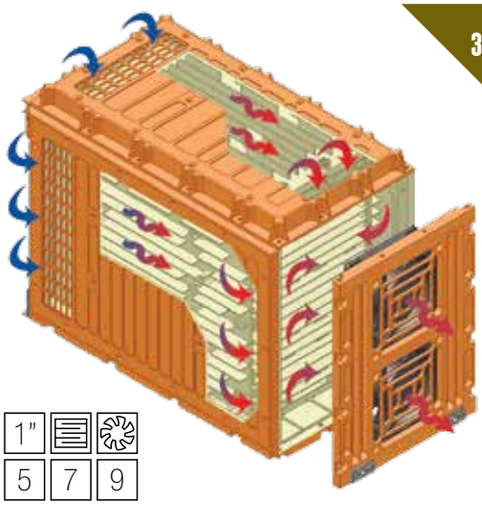
AVAILABILITY

The 3U CM Heat Exchanger Sidewalls ATR is available in a 3, 5, 7 & 9 slot versions. All versions share the same chassis architecture, PSU and front/rear panels, providing increased flexibility to match growing application demands.



LAYOUT & DESIGN

Internal layout is divided into 4 independent metallic partitions: I/O section at the front, card-cage, PSU section, and 2 exhaust fans at the rear. This isolates the card-cage, improves EMI/EMC and reduces PSU heat & electrical noise on system electronics.



DISSIPATION & COOLING

Heat within the enclosure is conducted to hollow sidewalls, top cover and rear panel forced-air heat exchangers where it is dissipated to the environment. Internal recirculation fans ensure dry air is forced across conduction or air-cooled payload modules, minimizing hot-spots and dissipating heat homogeneously.

RECOMMENDED PAYLOAD POWER RATINGS

(SELF DISSIPATING @ 55ºC AMBIENT: NO EXTERNAL AIRFLOW OR COLD PLATE PROVIDED)

CM-ATR-3U/FBL7 (9 SLOT)	≤ 300 watts
CM-ATR-3U/FBL7 (7 SLOT)	≤ 270watts
CM-ATR-3U/FBL5 (5 SLOT)	≤ 250 watts
CM-ATR-3U/FBL3 (3 SLOT)	≤ 200 watts

3U

CONVENTIONAL CONFIGURATION

COST-EFFECTIVE SCALABILITY

INCREASED HEAT DISSIPATION

HES-FBL

HES - FRONT TO BACK LOADED

CM MILITARY ATR PRODUCT RANGE

Heat Exchanger Sidewalls 3U ATR Series Specifications

designed for medium wattage VPX & cPCI-S applications with 0.8, 0.85 & 1" pitch eurocards

	CM-ATR-3U/ HES-FBL3	CM-ATR-3U/ HES-FBL5	CM-ATR-3U/ HES-FBL7	CM-ATR-3U/ HES-FBL9
SLOTS	3	5	7	9
WIDTH	134 mm	134 mm	134 mm	134 mm
HEIGHT	233 mm	233 mm	233 mm	233 mm
DEPTH	234 mm	285 mm	336 mm	387 mm
WEIGHT	5.0 Kg	5.8 Kg	6.6 Kg	7.5 Kg
CGTR THERMAL RES.	ΔT/W = 0.15°C	ΔT/W = 0.12°C	ΔT/W = 0.11°C	ΔT/W = 0.10°C
MAX. PSU POWER	575 watts (28 VDC 475 watts)			
PSU V-INPUT	28 VDC ±30%, 48 VDC ±30%, 72 VDC ±30%, 270 VDC ±30%, Autorange 90-132 VAC RMS & 180-264 VAC RMS @ 47-880 Hz, 3-Phase 200 VAC @ 47-880 Hz ±30%			
STD BACKPLANE	VPX & cPCI-S 3U 1" pitch backplanes			
SLOT/BOARD FORMAT	CCS: Conduction-cooled slots only for conduction-cooled ANSI-VITA 48.2 wedge-lock boards			
INTERNAL FAN	13.5 CFM	27 CFM	40 CFM	54 CFM
REAR FAN	84 CFM (Rugged) or 130/240 CFM (PX2)			
FRONT PANEL AREA	96 mm x 140 mm			
CM FRONT PANEL I/O	6 Power Pins (13 Amp) & 382 I/O Pins (5 Amp)			
TEMPERATURE SPECS	-40 °C to +85 °C Operating, -55 °C to 100 °C Storage			
MTBF	25° GB 86,000 Hours, 65° AIC 28,000 Hours			
MOUNTING TRAY	CM-TR-3U/HES-FBL3	CM-TR-3U/HES-FBL5	CM-TR-3U/HES-FBL7	CM-TR-3U/HES-FBL9

COMPLEMENTARY INFORMATION

- CM ATR Common Features
- CM ATR Backplanes
- CM ATR Power Supplies

OPTIONAL COLD PLATE MOUNTING

Chassis can be optionally cold plate mounted to increase power dissipation rates by approximately 10%.

HEAT EXCHANGER SIDEWALLS ATR ORDERING

For ordering information see page 127 of this catalog.

PART NUMBER EXAMPLE:

CM-ATR-3U/HES-FBL9/VPX/28VDC/A-475W/CMP/HETC/SBC/CCS/STDF-DC/BLU

- 9 slot, 3U Avionics Enclosure.
- Sealed Four Heat Exchanger Enclosure.
- 9 slot VPX Backplane for 3U 1" boards.
- 28VDC Power Supply Unit with 475W (+5 VDC @ 40A, +3.3 VDC @ 22A, ±12 VDC @ 8A).
- CM Front Panel fitted with MIL-DTL-38999 connectors.
- Heat Exchanger Top Cover.
- High profile Bottom Cover (40mm wiring clearance).
- Conduction-cooled Card-cage Slots (conduction-cooled modules only).
- Enclosure color: Dark Blue.

CM ATR ORDERING INFORMATION

3U Military ATR Chassis Ordering

SWaP military aerospace enclosure part number configuration

Please carefully follow our chassis ordering guide for configuring your 3U ATR part number. Note that all CM 3U Backplanes integrate a functional Temperature Supervisory Unit (TSU) that controls Power Supply and Fan operation. Remote optoisolated control switches for 'Battle-short' and chassis PSU 'on/standby' are also fitted as standard.

CHASSIS GENERIC PART NUMBER:

CM-ATR-3U /CT /B /I /W /FP /TC /BC /CS /F /C

/CT Enclosure Cooling Technique

S: Standard Sealed 3U Enclosure
SEF-18HP: Sealed with Extended Fins + 18 Heat Pipes 3U Enclosure
HES: Sealed with Heat Exchangers 3U Enclosure
HES-FBL(3-5-7-9): Sealed with Heat Exchangers 3U Enclosure
FAC: Flowthrough Air Cooled 3U Enclosure (open, non-sealed)

/B Backplane Type

VME64x: Military VME64x Backplane (5 Slot 3U 1" Pitch)
cPCI: Military Compact PCI Backplane (5 Slot 3U 1" Pitch)
cPCI-S: Military Compact PCI Serial R.2.0 Backplane (3-5-7-9 Slot 3U 1" Pitch)
VPX: VITA 46 Military VPX Backplane (3-5-7-9 Slot 3U 1" Pitch)
VPX-6: VITA 46 Military VPX Backplane (6 Slot 3U 0.85" Pitch)

/I PSU Input Power Voltage

28VDC: 28 VDC Input
48VDC: 48 VDC Input
72VDC: 72 VDC Input
270VDC: 270 VDC Input
90-264VAC: Autorange 90-264 VAC @ 47-880 Hz Input
200VAC-3Ph: 200 VAC 3 Phase @ 47-880 Hz Input

/W Power Supply Unit Watts

A-475W: 28 VDC (+5 VDC @ 40A, +3.3 VDC @ 22A, ±12 VDC @ 8A)
A-575W: All PSUs (+5 VDC @ 40A, +3.3 VDC @ 22A, ±12 VDC @ 12A)
A-675W: 28 VDC (+5 VDC @ 80A, +3.3 VDC @ 22A, ±12 VDC @ 8A)▲
A-775W: All PSUs (+5 VDC @ 80A, +3.3 VDC @ 22A, ±12 VDC @ 12A)▲

B-450W: 28 VDC (+5 VDC @ 20A, +3.3 VDC @ 45A, ±12 VDC @ 8A)
B-550W: All PS Us (+5 VDC @ 20A, +3.3 VDC @ 45A, ±12 VDC @ 12A)
B-564W: 28 VDC (+5 VDC @ 20A, +3.3 VDC @ 80A, ±12 VDC @ 8A)▲
B-664W: All PSUs (+5 VDC @ 20A, +3.3 VDC @ 80A, ±12 VDC @ 12A)▲

C-475W: 28 VDC (+5 VDC @ 20A, +3.3 VDC @ 22A, +12 VDC @ 16A,-12 VDC @ 8A)
C-575W: All PSUs (+5 VDC @ 20A, +3.3 VDC @ 22A, +12 VDC @ 21A, -12 VDC @ 12A)
C-775W: 28 VDC (+5 VDC @ 20A, +3.3 VDC @ 22A, +12 VDC @ 41A, -12 VDC @ 8A)▲
C-825W: All PSUs (+5 VDC @ 20A, +3.3 VDC @ 22A, +12 VDC @ 41A, -12 VDC @ 12A)▲

D-550W: 28 VDC (+5 VDC @ 40A, +3.3 VDC @ 45A, ±12 VDC @ 8A)▲
D-650W: All PSUs (+5 VDC @ 40A, +3.3 VDC @ 45A, ±12 VDC @ 12A)▲

E-550W: 28 VDC (+5 VDC @ 20A, +3.3 VDC @ 45A, +12 VDC @ 16A, -12 VDC @ 8A)▲
E-650W: All PSUs (+5 VDC @ 20A, +3.3 VDC @ 45A, +12 VDC @ 21A, -12 VDC @ 12A)▲

F-575W: 28 VDC (+5 VDC @ 40A, +3.3 VDC @ 22A, +12 VDC @ 16A,-12 VDC @ 8A)▲
F-675W: All PSUs (+5 VDC @ 40A, +3.3 VDC @ 22A, +12 VDC @ 21A, -12 VDC @ 12A)▲

All PSUs = All PSUs except 28 VDC input | 28 VDC = 28 VDC input only

▲PSU not available for CM-ATR-3U/FAC & CM-ATR-3U/HES-FBL chassis models

MOUNTING TRAY GENERIC PART NUMBER:

CM-TR-3U /CT

/FP Front Panel Layout

CMP: Standard CM front panel fitted with MIL-DTL-38999 connectors
UDP: User-defined front panel layout (requires customer drawing)

/TC Chassis Top Cover

STC: Standard Top Cover. Wiring clearance 13mm
FTC: Standard Top Cover. Wiring clearance 13mm. (Std. on SEF-18HP)
HTC: High profile Top Cover. Wiring clearance 35mm
HETC: Heat Exchanger Top Cover. Wiring clearance 13mm (Std. on HES & HES-FBL)

/BC Chassis Bottom Cover

SBC: Standard Bottom Cover. Wiring clearance below backplane 25mm
HBC: High profile Bottom Cover. Wiring clearance below backplane 40mm

/CS Chassis Card-Cage Slot

MCS: Mixed Card-cage Slots (mixed conduction-cooled & air-cooled boards)
CCS: Conduction-cooled Card-cage Slots (conduction-cooled boards only)
- MCS is not available for CM-ATR-3U/HES-FBL chassis models

/F Rear-Mounted Fan Assembly

STDF-DC: 2x42 CFM DC Rugged fans (HES & HES-FBL) or 1x27 CFM DC Rugged fan (FAC)

STDF-AC: 2x47 CFM 115 VAC @ 400Hz Rugged fans (HES & HES-FBL) or 1x27 CFM DC Rugged fan (FAC)

F115-400: 2x65 CFM 115 VAC @ 400Hz Rotron PX2 Military fans (HES & HES-FBL) or 1x65 CFM Rotron PX2 Military fan (FAC)

F200-400: 2x120 CFM 200 VAC 3PH @ 400Hz Rotron PX2 fans (HES & HES-FBL) or 1x120 CFM Rotron PX2 Military fan (FAC)

- No rear fan required for CM-ATR-3U/S & /SEF-HP, omit option from part number.
- Rugged fans are fitted with aluminum housing. Operating range: -10ºC to +70ºC
- Full military Rotron PX2 AC fans. Operating range: -54ºC to +125ºC

/C Chassis Color

B: Black, ***G:*** Navy Grey, ***E:*** Army Dark Earth, ***W:*** White, ***R:*** Red, ***PT:*** Platinum, ***YW:*** Yellow, ***GN:*** Green, ***BLU:*** Dark Blue, ***CR:*** Chromate MIL-C-5541 or ***O:*** Other

PART NUMBER EXAMPLE:

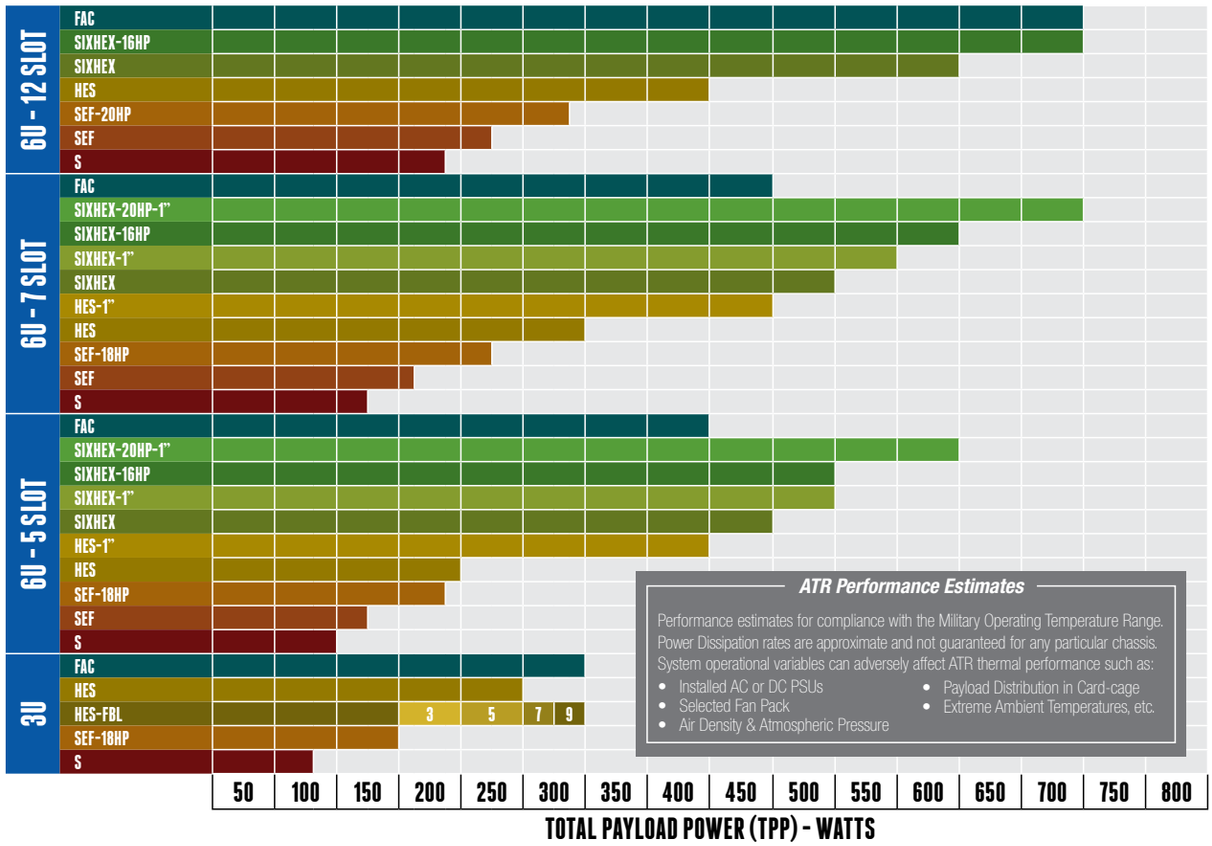
CM-ATR-3U/SEF-18HP/VPX/28VDC/A-475W/UDP/FTC/SBC/CCS/E

- 5 slot, Sealed with Extended Fins + 18 Heat Pipes 3U Avionics Enclosure.
- 5 slot, 3U VPX 1" Pitch backplane. 28VDC input power supply.
- A-475W power supply (+5 VDC @ 40A, +3.3 VDC @ 22A, ±12 VDC @ 8A).
- User-defined front panel layout (requires drawing).
- Finned Top Cover (↕13mm). Standard Bottom Cover (backplane ↕25mm).
- Conduction-cooled Card-cage Slots (conduction-cooled boards only).
- Enclosure color: Army Dark Earth.

CM ATR CHASSIS THERMAL TESTING

CM ATR Chassis Selection Chart

based on system total payload power dissipation



Glossary of Technical Terms

establishing new chassis engineering terminology

LT : Chassis Linear Thermal Test (Linear Test)
PT : Chassis Peak Slot Thermal Test (Peak Test)
MT : Chassis Mixed Linear & Peak Slot Thermal Test (Mixed Test)
LT-AV : Linear Test Payload Average Temperature
PT-AV : Peak Test Payload Average Temperature
MT-T1 : Mixed Test Slot 1 Payload Temperature
MT-AV : Mixed Test Payload Average Temperature (excluding Slot 1)
ΔT : Chassis Payload Delta-T with respect to Ambient Temperature
TPP : Total Payload Power
TCEP : Total Chassis Electrical Power
CPTR : Chassis Payload Thermal Resistance
CGTR : Chassis Global Thermal Resistance

CHMPF : Chassis Half MTBF Power Factor
CPMDC : Chassis Payload MTBF Degradation Coefficient
CIA : Chassis Installed Airflow
CEA : Chassis Effective Airflow
ADDT : Ambient Airflow Delta-T
CSAOP : Chassis Stable Airflow Operating Point
CIARC : Chassis Impedance Airflow Reduction Coefficient
MFARC : Multiple Fan Airflow Reduction Coefficient
OARC : Overall Airflow Reduction Coefficient
SCIDPC : Sealed Chassis Indirect Delta-T Power Coefficient
PEADT : Payload to Exhaust Airflow Delta-T
CCAAT : Chassis Cooling Airflow Average Temperature